

**WHAT IS CLAIMED IS:**


- 1           1.       An integrated circuit system, comprising:  
2           a die incorporating an integrated circuit and having a top side and a  
3           bottom side, the top side supporting an electrical signal communication  
4           metallization and a top side thermal dissipation metallization, and the bottom side  
5           supporting a bottom side thermal dissipation metallization.
- 1           2.       The system of claim 1, wherein the electrical signal communication  
2           metallization comprises a plurality of bonding elements.
- 1           3.       The system of claim 2, wherein the bonding elements are in a  
2           peripheral region of the top side of the die.
- 1           4.       The system of claim 3, wherein the top side thermal dissipation  
2           metallization is disposed in a central region of the top side of the die.
- 1           5.       The system of claim 4, wherein the central region is surrounded by  
2           the peripheral region.
- 1           6.       The system of claim 1, wherein the electrical signal communication  
2           metallization is disposed in a peripheral region of the top side of the die  
3           surrounding a central region of the top side of the die containing the top side  
4           thermal dissipation metallization.
- 1           7.       The system of claim 1, wherein the top side thermal dissipation  
2           metallization comprises a patterned metal layer.
- 1           8.       The system of claim 7, wherein the patterned metal layer comprises  
2           at least one through-hole.
- 1           9.       The system of claim 8, wherein the patterned metal layer comprises  
2           an array of through-holes.
- 1           10.      The system of claim 1, further comprising a package comprising a  
2           top heat spreader metallurgically bonded to the top side thermal dissipation  
3           metallization of the die.

1           11.    The system of claim 10, wherein the integrated circuit is connected  
2 electrically to the top side heat spreader by an electrical path extending through  
3 the top side thermal dissipation metallization.

1           12.    The system of claim 10, wherein the package further comprises an  
2 electrical interface and a substrate containing a wiring interconnection between  
3 the electrical signal communication metallization and the electrical interface.

1           13.    The system of claim 12, wherein the top heat spreader is mounted  
2 on the substrate and forms a lid of the package covering the top side of the die.

1           14.    The system of claim 10, wherein the package further comprises a  
2 bottom heat spreader metallurgically bonded to the bottom side thermal  
3 dissipation metallization of the die.

1           15.    A method of making an integrated circuit system, comprising:   
2           forming on a top side of a substrate multiple die regions each having an  
3 electrical signal communication metallization and a top side thermal dissipation  
4 metallization;  
5           forming on a bottom side of the substrate a bottom side thermal dissipation  
6 metallization for each die region; and  
7           singulating the die regions to form respective integrated circuit dice.

1           16.    The method of claim 15, wherein, in each die region, the electrical  
2 signal communication metallization comprises a plurality of bonding elements  
3 disposed in a peripheral die region and the top side thermal dissipation  
4 metallization is disposed in a central die region surrounded by the peripheral die  
5 region.

1           17.    The method of claim 15, wherein each top side thermal dissipation  
2 metallization comprises a metal layer with an array of through-holes.

1           18.    The method of claim 15, further comprising mounting each  
2 singulated die in a respective package having a top heat spreader, wherein  
3 mounting a singulated die comprises metallurgically bonding the top heat

4 spreader of a package to the top side thermal dissipation metallization of the  
5 singulated die.

1           19.    The method of claim 18, wherein the package additionally includes  
2 a substrate and mounting the singulated die further comprises mounting the  
3 package substrate to the bottom side thermal dissipation metallization of the  
4 singulated die.

1           20.    The method of claim 18, wherein the top heat spreader is mounted  
2 on the substrate and forms a lid of the package, and further comprising  
3 encapsulating the die within the package with an encapsulating material.